CHAPTER 8. NONPOINT/NONPOINT SOURCE TRADING

Nonpoint/nonpoint trading *describes situations where nonpoint sources that have a responsibility or a commitment to reduce pollutant loads arrange for reductions at other nonpoint source sites.*

Introduction

Nonpoint/nonpoint trading occurs where nonpoint sources meet state or local requirements by installing best management practices (BMPs) or conducting restoration at another location. The terms *on-site* and *off-site* describe where BMP and restoration projects occur relative to the nonpoint source property in question. As a result, nonpoint/nonpoint trading is a somewhat new term to describe off-site activities. (To be consistent with other chapters, this chapter uses the term "nonpoint source" to mean landowners and contributors to nonpoint source pollution).

This chapter focuses on arrangements where at least one nonpoint source faces a voluntary commitment or mandatory, enforceable requirement to implement BMPs or reduce loadings by some amount and the buyer pays at least part of the cost to the seller in cash or in services. Exhibit 8.1 describes two such trades.

Off-site options and trading programs are not alone in increasing the effectiveness of nonpoint source pollution control. Many watershed management and related programs provide cost-sharing, low-interest loans and grants, and technical assistance to support nonpoint source controls. Some of these programs embody the same cost-effectiveness principles as trading.

EXHIBIT 8.1: NONPOINT/NONPOINT TRADES AT LAKE DILLON, COLORADO

Several nonpoint/nonpoint source trades have been implemented at Lake Dillon, Colorado, under a framework originally established for point/nonpoint source trading that has been in place since 1984. The four POTWs discharging to the lake have not needed to trade to meet their loading allocations due to high plant operating efficiencies and slower-than-anticipated population growth. Instead, controlling nonpoint source loading is now a major objective in the lake's phosphorus mitigation strategy.

In one trade, the Town of Frisco plans to use phosphorus loading reductions the Frisco Sanitation District achieved with stormwater controls to offset additional phosphorus loadings a proposed new golf course is expected to generate. (This trade also is an example of banking reductions for future application.) In another trade, Keystone Resort paid for sewering individual septic systems in specific areas to produce reductions it could use to offset new nonpoint source loads projected to come from future resort development. In both trades, additional nonpoint source loads were fully offset with nonpoint source loading reductions (i.e., no net gain in nonpoint source loadings).

Sources: *Incentive Analysis for Clean Water Act Reauthorization: Point Source/Nonpoint Source Trading for Nutrient Discharge Reductions* prepared for the EPA Offices of Water and Policy, Planning, and Evaluation, April 1992; and Northwest Colorado Council of Governments, personal communication, May 1996.

An important reason nonpoint sources, regulators, and watershed managers exercise off-site options is to capture cost savings or additional environmental benefits unavailable from on-site options. A number of factors can influence costs and expected effectiveness of nonpoint source control, including site characteristics; available BMP options; proximity to incompatible land uses (e.g., a wetland in the middle of an urban area); and location-specific technical considerations related to implementation, operation, maintenance, monitoring, and other actions. Trading, which can result in more selective siting of BMPs, can minimize costs and maximize environmental results.

8.1 Regulatory Issues

The major distinguishing regulatory feature of nonpoint/nonpoint source trading is that trading parties are rarely regulated by federal implementation of the CWA. Instead, the federal government relies on state programs, operated in part with federal dollars, to manage nonpoint source pollution by vesting the states with management responsibility. This situation gives states flexibility in how they exercise that responsibility and enables them to defer to local land use authorities.

Examples of this approach are found in section 319 of the CWA and the Coastal Zone Act Reauthorization Amendments (CZARA). Under these laws, coastal states develop and implement comprehensive management plans (subject to EPA approval) that address nonpoint source pollution. Federal grant eligibility under the nonpoint source and coastal zone management programs is contingent on EPA approval of such plans.

States and local governments rely on a wide variety of regulatory and nonregulatory tools to manage nonpoint source pollution. The specific approach taken in any given jurisdiction reflects a combination of local economic and environmental priorities and preferences, as well as historical treatment of land uses and other local considerations. As a result, regulation of nonpoint sources varies greatly across jurisdictions, and readers interested in trading are encouraged to familiarize themselves with local nonpoint source management approaches.

Three strategies for managing nonpoint source pollution that state and local governments employ are discussed below:

- State and local regulatory programs
- Quasi-regulatory programs
- Voluntary programs.

In addition, wetland mitigation banking is available as a management tool under the CWA section 404 permit program. It also is discussed below.

State and Local Regulatory Programs

State and local governments can use permitting, licensing, or other prior approval processes to protect water quality, natural resources, and public health from land uses that generate or have the potential to generate nonpoint source pollution. State and local governments also can operate permit programs in which an activity*s location triggers permit review. Exhibit 8.2 describes key features of state and local permit programs and provides examples of activities and geographic areas that most often receive attention from such programs.

EXHIBIT 8.2: STATE AND LOCAL PERMIT PROGRAMS FOR NONPOINT SOURCES

State and local permit programs involving nonpoint sources can be extremely diverse due to the fact that they are optional and lack federal guidance. These programs, however, do have some common features. Permit programs also tend to apply to a common set of activities and a common set of geographical areas.

Key features:

- Enabling legislation and/or ordinance
- Definition, description, delineation of area subject to regulation
- Identification of uses and activities allowed, permitted, and prohibited
- Permitting criteria, design, and performance standards (sometimes specified by state statute)
- Required and/or voluntary BMPs
- Monitoring requirements
- Requirements for prevention or mitigation of adverse impacts
- Penalties for noncompliance

Examples of regulated activities *(many of which can also fall under regulation by the NPDES program)**:***

- Building and development, including roads
- Timber harvesting
- Landfills
- Livestock management
- Pesticide and fertilizer application
- Marina siting
- Golf courses
- Septic system siting and operation

Common special permit areas:

- Wetlands and adjacent uplands
- Shorelines
- Floodplains
- Wellhead protection areas
- Coastal zones
- Special management areas
- Riparian zones
- Erosion-prone areas such as hillsides
- Aquifer recharge areas
- Drinking water supply sources
- Sensitive-designated areas

Unregulated sources can be trading partners with regulated or unregulated sources. Activities may be exempt from permit review, always permitted, or omitted in ordinances. "Grandfather" clauses also provide exemptions for land uses that existed prior to enactment of enabling legislation.

Jurisdictions exempt certain activities from permit programs for a number of reasons, including the following: use compatible with water quality protection; use provides substantial and broad economic benefits; and/or use provides substantial public benefits. Such unregulated nonpoint sources are generally addressed in one or more management plans that depend on quasi-regulatory programs or voluntary implementation of BMPs.

Flexibility at the local level creates significant opportunities for trading among nonpoint sources. Combinations of permitted and unregulated nonpoint sources may exist within a watershed. Both types of sources, however, may trade with each other.

Local planning departments and other agencies with permitting authority often have wide-ranging choices of what BMPs and restoration requirements they include in permits. Minimum standards establish baseline conditions for permits. Beyond those, local officials typically specify conditions based on a balance between environmental protection considerations and economic development objectives.

Local officials concerned about balancing economic impacts typically seek ways to minimize compliance costs while maintaining target levels of environmental protection. Many local governments accept off-site options after permittees show that on-site options are economically or technically less desirable or infeasible. Some jurisdictions also offer permittees the option to pay a fee to support public and private environmental restoration projects in lieu of on-site action, particularly where on-site actions are less beneficial to the ecosystem or watershed than a more holistic approach.

Since many local governments have experience administering permits that allow for off-site BMPs and restoration or fees in lieu of on-site action, implementing nonpoint/nonpoint source trading is not a new concept. Those interested in expanding existing options for such nonpoint/nonpoint source trades should first review ordinances, memoranda of agreement, management plans, and other relevant documents to determine whether revisions are necessary to allow more frequent consideration of off-site or fee-in-lieu contributions.

Quasi-Regulatory and Voluntary Management Programs

A variety of quasi-regulatory approaches create incentives for nonpoint/nonpoint source trading and a framework for implementation of trades. These approaches include nonpoint source management plans, cost-share agreements, and load allocations (LAs) that result from TMDL development.

Management plans that address nonpoint source pollution are often developed for watersheds, jurisdictions, special areas, or specific source categories. Plan sponsors encourage voluntary BMP implementation through a variety of mechanisms, including low interest loans, direct grants, cost-sharing, technical assistance, outreach and public education, provision of benefits contingent on BMP implementation (e.g., program eligibility, financial support), and linking other regulatory and economic decisions to implementation.

A TMDL or other watershed project that identifies contributing sources and develops target loads also may provide incentives to trade. TMDLs develop LAs to allocate portions of the total load to selected nonpoint sources. LAs are implemented through state and local nonpoint source control programs that vary in their reliance on regulatory requirements and voluntary measures to achieve loading reductions.

Wetland Mitigation Banking

The CWA section 404 permit program regulates discharges of dredged or fill material into waters of the United States, including wetlands. The section 404 program relies on compensatory mitigation to offset unavoidable impacts to wetlands

and aquatic resources. Mitigation typically involves the restoration, creation, enhancement, or, in exceptional circumstances, preservation of wetlands.

Federal guidance on wetland mitigation "banking" encourages the consolidation of small, fragmented mitigation projects into large, contiguous sites that are more beneficial to the environment. Units of restored, created, enhanced, or preserved wetlands are expressed as "credits," which may subsequently be withdrawn to offset impacts, or "debits," incurred at a project development site.

While traditionally used to offset wetland losses, a mitigation bank also can be used to compensate for other impacts to aquatic resources, such as point and nonpoint sources of pollution, where wetlands in the mitigation bank serve to enhance or protect water quality. In this way, nonpoint/nonpoint trades may take place within the context of wetland mitigation banking.

8.2 Economic Issues

Like other types of trading, cost and cost-effectiveness are primary economic considerations for nonpoint source trades between on-site BMPs and off-site alternatives. There is a significant distinction in costs for nonpoint source control, however, that affects nonpoint/nonpoint trades: costs for nonpoint source controls are highly dependent on site-specific characteristics.

Awareness of site-specific factors that influence BMP cost, and likewise cost-effectiveness, allows identification and comparison of specific BMP options. These factors, which include physical site conditions, nature of BMP required, scale of BMP implementation or restoration efforts, availability of cost-sharing, and presence of transaction costs, are discussed below.

Before addressing each of these factors, though, it is important to note that nonpoint sources and communities in which they exist may have different objectives. Nonpoint sources are primarily concerned with minimizing costs for BMP implementation and typically are concerned about cost-effectiveness only where performance standards are applicable. Communities sponsoring trading also are interested in providing cost savings to nonpoint sources, but not at the expense of environmental goals. They are more concerned with achieving environmental goals as cost-effectively as possible. Reconciling stakeholder objectives and providing clear incentives are critical to designing successful trading programs.

Physical Site Conditions

Trading provides nonpoint sources with opportunities to select the least costly BMP implementation option that will achieve their environmental objective. This may involve taking an action off-site that is less expensive than it would be on-site. It also may involve selecting a different, less expensive off-site BMP that is appropriate. BMP suitability depends on site conditions, so options and costs vary from site to site.

The cost of a specific BMP varies with local physical conditions, such as slope, soil type and permeability, vegetative coverage, micro-climates, land uses, size of drainage area, and depth to bedrock. This is especially true for structural BMPs because their design, construction, operation, and maintenance must be

tailored to site conditions. The terms *structural* and *nonstructural* refer to two types of BMPs. Structural BMPs are those which require construction efforts or physical changes to a site. Nonstructural BMPs do not change physical site conditions. Instead, they change *how* humans use a site.

Nature of BMP Required

Measures available to control nonpoint source pollution include a range of physical structures and natural systems, as well as nonstructural behavioral changes and protection efforts. Often, nonstructural BMPs are less expensive than structural BMPs to implement because they involve less engineering design, site preparation (e.g., grading), and construction, all of which can be relatively expensive. Thus, a site that would require structural BMPs to achieve desired loading reductions can arrange a trade that uses less expensive off-site nonstructural BMPs.

Even though nonstructural BMPs tend to be less expensive than structural BMPs, they can be costly when they require land purchases or other resource-intensive actions. Alternative techniques, such as conservation easements, are often available to supplement or replace expensive land purchases and other actions.

Scale of BMP Implementation

Nonpoint/nonpoint source trading can provide opportunities to take advantage of economies of scale (which occur when average unit cost decreases as scale increases). Larger BMPs and restoration projects are generally less expensive per unit than smaller ones of the same type. Certain kinds of costs, such as those related to design and equipment, are relatively stable regardless of size, and smaller projects have fewer units (e.g., feet, cubic feet, acres) over which to spread such costs. However, proximity to existing activities and effective scheduling of resources can make small-scale BMPs more cost-effective.

Several types of trading arrangements help nonpoint sources take advantage of economies of scale. Many involve *piggybacking* or *pooling.* Piggybacking describes arrangements where a nonpoint source contributes additional funding to expand a project*s scope beyond what would have been implemented without the trade. Pooling describes arrangements where several nonpoint sources responsible for implementing individual BMPs or mitigating wetland losses implement a single project together. Exhibit 8.3 illustrates these concepts.

Both approaches offer advantages to nonpoint sources, project sponsors, resource managers, and watersheds by lowering unit costs and increasing the frequency and size of well-designed and managed restoration projects. These approaches also can reduce or eliminate transaction costs associated with trade identification, evaluation, implementation, and monitoring.

Availability of Cost-Sharing

Several nonpoint source management programs offer assistance for BMP implementation in the form of cost-sharing, direct grants, loans, and technical assistance. Cost-sharing opportunities are especially prevalent in agricultural programs, and other situations in which affordability of BMPs is a concern. The availability of cost-sharing plans for certain types of nonpoint sources may make them

EXHIBIT 8.3: TWO EXAMPLES OF POOLING AND PIGGYBACKING: FEE-BASED WETLAND MITIGATION PROGRAMS IN MARYLAND AND LOUISIANA

The Maryland Department of Natural Resources (DNR) may accept fee-based compensation for mitigation requirements if it determines that creation, restoration, or enhancement of nontidal wetlands is not feasible. In most cases, monetary compensation is acceptable if the size of the nontidal wetland loss is less than one acre and mitigation is not feasible on-site. DNR determines the mitigation acreage requirements as a function of the size of the permitted impact and an established mitigation ratio—3:1, 2:1, or 1:1. Per acre mitigation fees are determined based on the cost to buy land in the affected county, plus design, construction, and monitoring costs. (In 1993, they ranged from $11,000 to $52,000 per acre.) The fee option enables DNR to collect and pool compensatory mitigation fees from small development impacts to fund larger nontidal wetland restoration, creation, and enhancement projects. DNR presented the fee option as a mechanism not only to reduce the administrative burden on the regulatory process, but also to serve as a means of fulfilling its responsibility to mitigate for impacts of less than 5,000 square feet, for which it does not require individual mitigation projects.

The Nature Conservancy*s Louisiana field office (LNC) administers a program in which it accepts fees in compensation for unavoidable losses of wetlands stemming from development activities located in southeastern Louisiana. LNC uses compensation fees for off-site preservation and long-term management activities of degraded pine flatwood wetlands. In all cases, the U.S. Army Corps of Engineers (Corps) determines whether fee-based compensatory mitigation is acceptable after potential impacts have been avoided, unavoidable impacts have been minimized, and feasible on-site mitigation measures have been determined to be impracticable. The Corps also determines the amount of acreage that must be mitigated through a standardized process that quantifies the overall natural quality of the wetlands in the area. Compensatory fees payable to the trust fund take into account the appraised ecological value of the developed property and the estimated loss of ecological value as a result of the development. Valuation calculations are primarily the Corps *s responsibility.

more likely to install BMPs. It also will make some BMPs subsidized with cost-share funds less expensive to the nonpoint source than other BMPs. Thus, these sources may be good candidates for off-site partners in trading programs.

Transaction Costs

Nonpoint/nonpoint source trading involves some transaction costs that are different from those identified with other trading types. The major difference stems from the fact that nonpoint sources tend to be less conspicuous—by definition they are diffuse. They are also typically smaller and more numerous. These tendencies can make identifying suitable trades costly. In addition, a nonpoint source can experience transaction costs in evaluating off-site options. Transaction costs vary based on factors including:

- Ability to identify other nonpoint sources.
- Number and proximity of off-site options.
- Similarity of nonpoint source candidates.
- Complexity of physical conditions at area nonpoint sources.

- Availability of preexisting data at off-site sources.

- Efforts required to compare off-site options to on-site options.

Local governments and state agencies involved in nonpoint source pollution management can help reduce transaction costs by supplying information about potential trading partners. Nonprofit environmental organizations also might be able to direct interested parties to candidate nonpoint source trading partners. Additionally, watershed management, growth management, and local comprehensive plans often identify unaddressed nonpoint source pollution problems.

8.3 Data-Related Issues

Nonpoint/nonpoint trading may require several types of data. Pollutant loads and water quality data provide an indication of the ability of BMPs to control nonpoint source pollution and enhance watershed ecology. Economic information enables cost comparisons between BMP options, while geographic data helps understand the types and distribution of land uses that contribute to nonpoint source pollution in watersheds.

Pollutant Loads and Water Quality Monitoring Data

In many places, nonpoint/nonpoint trading relies on creative strategies, simple techniques, and approximations to identify opportunities and evaluate results because the quantity and quality of pollutant loading and water quality data vary considerably. Unlike point sources, nonpoint source loads are not typically monitored at the source. When loads are measured at the water*s edge, it is often difficult to attribute loads to specific near-shore and upland sources.

Data may be of sufficient quantity and quality to support trading where data collection and analysis efforts exist as part of other programs. As a result, data quantity and quality is a site-specific issue that requires careful consideration. In urban areas, ambient monitoring conducted for stormwater programs and by point sources as part of their NPDES permit requirements can provide useful information for nonpoint/nonpoint source trading. In urban and rural areas, U.S. Geological Survey monitoring stations also provide some data. Other sources of data include:

- TMDL waterbody analyses, especially where load allocations are made.

- Section 319 monitoring programs.

- National Estuary Program estuaries.

- Great Lakes, Chesapeake Bay, and Gulf of Mexico programs.

- Federal, state, regional, and local special management areas.

- Nonpoint source-specific agencies and programs.

- Demonstration and pilot projects.

- Academic studies.

In the absence of site-specific data, nonpoint/nonpoint trading can be supported by a variety of techniques that are available to estimate BMP pollution control efficiencies. These techniques range from simple runoff and soil loss

equations to more complex ecosystem modeling and simulations.

These techniques have been applied with good results to structural BMPs, such as infiltration basins, vegetative filter strips, sediment barriers, and detention ponds. Their applicability to nonstructural BMPs, such as street cleaning, air pollution control, public education, and land use planning, is still an emerging science. As a result, relatively few data are available that characterize the effectiveness of nonstructural BMPs.

Nonpoint/nonpoint source trading can be initiated with the best available data, using estimates if necessary. As trading occurs, managers can conduct periodic evaluations to determine if program design or administration adjustments are warranted. Additionally, as trading evolves, monitoring improvements and other advances can be used to increase the data precision and enhance environmental results.

Economic and Geographic Data

Economic and geographic data related to nonpoint sources are typically available from state and local government agencies, special regional and university-based programs, and federal publications. Cost estimates for BMP implementation in specific areas are not always available, but a variety of sources provide estimates of incremental unit costs and describe how to adjust such general estimates for source, location, climate, and other site-specific factors.

Maps and other records indicating location of potential trading partners and existing BMPs are generally available from state and local planning departments. These same departments, universities, or regional governmental and watershed organizations sometimes have geographic information systems that can produce detailed maps showing, for example, zoning, land use, soil conditions, and topography.

8.4 Technical and Scientific Issues

Nonpoint source pollution occurs when rain, snowmelt, or irrigation return flows move over and through the ground, transporting pollutants from the land to surface water. Nonpoint source pollution also results from atmospheric deposition (i.e., pollution from rain or airborne contaminants) and hydrologic modification (e.g., channelization and channel modification, dams, and streambank and shoreline erosion). Nonpoint sources contribute to water quality problems associated with nutrients, pesticides, metals, organics, bacteria, low dissolved oxygen, and suspended sediment.

The way in which nonpoint source pollution occurs raises several scientific issues that must be considered to undertake nonpoint/ nonpoint trades. These issues include:

- Natural watershed conditions (local soils and precipitation, for example).
- Effectiveness of BMPs.
- Spatial, temporal, and chemical differences among nonpoint source loads.

Natural Conditions

Since nonpoint source loads are highly dependent on natural, random, and mostly uncontrollable events, understanding and predicting the results of trades may be

difficult. Climatic events, such as precipitation, wind, and temperature, greatly affect delivery of nonpoint source loads. Geologic and hydrologic conditions, including surface soil types, underlying geologic structure, and watershed hydrology, also influence nonpoint pollution.

Nonpoint/nonpoint trading programs require flexibility to handle the variability of nonpoint source loads. For example, above-average rainfall might cause increased nonpoint loads, even after BMPs have been implemented through a trading program. This situation does not necessarily reflect ineffective BMPs. Use of scientific models or other analytical tools can help program administrators understand the effects of random watershed conditions and verify the effectiveness of trading programs.

Effectiveness of BMPs

The effectiveness of a BMP at a particular site is subject to a variety of factors that interact in sometimes complex and/or hidden ways. Some factors are human-influenced, while others are natural or otherwise uncontrollable. They include:

- Proper installation, operation, and maintenance.
- Suitability of BMP selection and design for source and pollutants.
- Physical site conditions such as slopes, soils, and water table.
- Climate, including precipitation, temperature, and wind.

Because such variability exists, available estimates for BMP effectiveness are usually expressed in the form of ranges or averages. But measuring the effectiveness of non-structural BMPs is more problematic than measuring the effectiveness of structural BMPs. Effectiveness can be expressed in terms of reduced loads, improved water quality, and/or other benefits such as habitat or flood protection. Scientific models are also used to evaluate potential effectiveness of BMPs under a range of conditions. Departments of agriculture and local planning departments are two potential sources of BMP effectiveness information along with *Guidance Specifying Management Measures For Sources Of Nonpoint Pollution In Coastal Waters* (USEPA, Office of Water, 840-B-92-002, January 1993).

One way to address such variability is to index pollutant loading reductions to a baseline year, as was done for the Lake Dillon Program. By doing this, program managers would not penalize BMPs that removed relatively small amounts of pollutants during dry periods or over-credit BMPs that removed significant amounts despite poor performance during heavy rainfall conditions.

Side effects are an important consideration in evaluating and comparing trading options. For example, management practices that intercept pollutants leaving a source (e.g., installation of infiltration basins) may reduce runoff, but also may increase infiltration to groundwater. Such BMPs may not be suitable for trading in areas with high groundwater tables.

Again, flexibility is the key for administrators of nonpoint/nonpoint trading programs to manage variability. Just as they account for variability in natural conditions, trading programs must

account for variations in BMP effectiveness.

Spatial, Temporal, and Chemical Considerations

Spatial, temporal, and chemical differences and uncertainties can exist among loads from nonpoint sources. This can be true within as well as across source categories. Estimating relative impacts of load reductions from one nonpoint source compared to that from another helps predict the potential effects of trading on water quality.

Nonpoint/nonpoint source trading shifts additional load reductions from one site in a watershed to another site. As noted above, nonpoint source loads are site-specific and vary according to a number of factors. Thus, changing the spatial configuration of nonpoint source loads to waterbodies can produce results for water quality that are difficult to predict.

Substituting reductions in nonpoint source loads from one site for another also can change the timing of loads to waterbodies. The major reason for these changes in the temporal arrangement of loads is that discharges from different nonpoint sources occur at very different rates. For example, a sharply sloped, paved urban area can discharge much higher quantities of runoff than a flat, vegetated septic system field during a single rain event. Thus, trading may alter the rate at which selected pollutants are discharged, producing uncertain effects on water quality.

In addition to effects from spatial and temporal configurations of nonpoint source loads, trading can change the overall chemical composition of loadings. This facet of nonpoint/nonpoint trading occurs for two reasons: (1) different nonpoint sources produce different types of pollutants; and (2) the same pollutant from different types of nonpoint sources may produce different reactions in receiving waters.

Some nonpoint source loads are associated with dissolved constituents (e.g., those carried by irrigation return flows and leaking septic systems). Others are associated more closely with solid phase constituents (e.g., urban runoff and soil erosion losses from cropland). Trades that affect the proportion of various constituents in nonpoint loads can significantly modify water chemistry.

Managing Load Differences

Given the fluctuating nature of nonpoint source loads, nonpoint/nonpoint trading programs can be relatively difficult to quantify and more uncertain than other types of programs. Various methods for managing this uncertainty, however, are available to water quality authorities and other stakeholders in a trading program. These methods help to ensure that water quality objectives are achieved.

One approach is to compare nonpoint source loads using average loads over a specific time period, such as a season, year, or low-flow period. Average loads for various nonpoint sources can highlight the relative magnitude of spatial, temporal, and chemical differences.

TMDL margins of safety are another approach to ensure achievement of water quality objectives in trade situations by setting aside a portion of pollutant allocations. Margins of safety may reflect uncertainty about the relative effectiveness of nonpoint source controls where trading

is an option. Using margins of safety to structure individual nonpoint/nonpoint trades can decrease the uncertainty associated with load reductions from nonpoint source controls.

Exchange rates, or trading ratios, define the reduction in pollutant loading at one site needed to match reductions in loading at another. Trading ratios can be used for nonpoint/nonpoint trades where loading reductions are less certain at one site than at another (or result in less water quality improvement). In such situations, a nonpoint source purchases more than one unit of off-site load reductions for every unit of credit received. This "extra" reduction acts as an insurance policy to make sure that expected water quality improvements actually occur.

8.5 Institutional Issues

Institutional support for nonpoint/nonpoint source trading is key to successful trades. Institutions involved can be as numerous and diverse as the types of nonpoint sources in a watershed. Typically, management of nonpoint sources is based on the economic sector (e.g., farming, forestry, etc.) and/or jurisdiction (e.g., city, county, special district).

The result is often a patchwork of oversight and assistance, which requires coordinated efforts among institutions. Overlaps occur frequently where two or more institutions are involved with the same nonpoint sources in the same areas. Just as frequently, different institutions can be involved in nonpoint source management on adjacent parcels, but not coordinate their activities. Further, gaps in coverage exist for selected categories in some areas.

Identifying Supporting Institutions

Listing the types of nonpoint sources located in a trading area helps identify those institutions which could play a role in supporting trading. Although specific institutional structures vary from state to state, and even at the local level, Exhibit 8.4 lists agencies and departments that typically manage different types of nonpoint sources.

Any organization involved with nonpoint sources that might be trading candidates should be invited to participate in early discussions about trading. Other stakeholders can benefit from their knowledge and expertise about particular nonpoint sources and BMPs. Additionally, such participation ensures that nonpoint trading is examined as broadly as possible before eliminating any sources or locations from consideration.

Once it becomes clear which nonpoint sources are likely to be trading partners (e.g., agriculture with agriculture, septic with agriculture), institutions not currently involved with those sources opt out of playing a significant role in trading. Nevertheless, keeping them informed about trading developments provides opportunities for them to identify future trading possibilities.

Coordinating Institutions

Achieving sufficient coordination among participants may be particularly challenging for nonpoint source trading. Many organizations involved in nonpoint source management work with specific nonpoint sources; communication among the organizations is limited. Therefore, when trading partners are similar with respect to category, activity, location, and

EXHIBIT 8.4: INSTITUTIONS THAT MANAGE VARIOUS TYPES OF NONPOINT SOURCES	
Nonpoint Sources	**Institutions**
Agricultural runoff	Natural Resource Conservation Service, state agriculture or soil and water conservation agencies, water conservation districts
Silvicultural runoff	National Forest Service, state forestry agencies
Urban runoff and construction activities	State and local permitting authorities, including land use planning and zoning departments/boards
*Septic systems**	State and local public health departments
Residential urban runoff	State and local environmental protection departments, consumer protection and education offices
*Marinas and recreational boating**	U.S. Coast Guard, state and local natural resource offices
Hydromodification	U.S. Army Corps of Engineers, delegated Section 404 states, local governments, navigation districts
**Although nonpoint sources, these can fall under regulation by the NPDES program.*	

jurisdiction, coordination is relatively easy; when trading partners are dissimilar with respect to these factors, coordination is more challenging.

Coordination challenges often can be met with minimal additional effort. Stakeholders can identify a lead organization to facilitate coordination and clarify responsibilities.

Candidates for this role include organizations with permitting authority or with management responsibility for areas where traded BMPs will be implemented, as well as umbrella institutions such as watershed organizations and regional planning commissions. Nonprofit environmental organizations also typically are involved with many different sources. Other mechanisms to enhance coordination include work groups, task forces, and information sharing. Exhibit 8.5 illustrates roles in one nonpoint/nonpoint trading case study.

8.6 Administrative Issues

In most areas, regulatory and nonregulatory nonpoint source management programs provide a framework for trading. Trading is most successful when it is integrated into existing regulatory and management frameworks, making changes or adding new responsibilities when necessary. Nonpoint/nonpoint source trading may require the following types of administrative support:

- Establishing guidelines for trading (e.g., eligibility, trading ratios).
- Information management and dissemination.
- Facilitation and brokering.

EXHIBIT 8.5. INSTITUTIONAL ROLES IN A POTENTIAL SELENIUM TRADING PROGRAM

In a study examining the feasibility of using economic incentives to control nonpoint source pollution from subsurface farm drainage in California*s Central Valley, the Environmental Defense Fund (of a) proposed a program that relies on trading. The Regional Water Quality Control Board would specify a TMDL for selenium in the San Joaquin River and then assign allocations (essentially LAs) to regional drainage districts, or directly to water districts (in the absence of a regional district) in the form of discharge permits. The regional districts would then allocate LAs among contributing water and drainage districts. The trading program would provide an additional opportunity to adjust load allocations. Through trades, districts could achieve a cost-effective distribution of pollution reduction responsibility (which may change from year to year) and resolve any equity issues resulting from the initial allocation. The regional drainage districts would assist member districts by identifying potential trades, recording transactions, and enforcing permit limits.

Source: *Plowing New Ground: Using Economic Incentives to Control Water Pollution from Agriculture* Environmental Defense Fund (T. Young and C. Congdon), 1994, pp 126-127.

- Tracking and documentation.
- Technical assistance and outreach.
- Coordination among participants.

Administrative needs differ for nonpoint/nonpoint trades that involve at least one permitted party compared to trading strictly among unregulated partners.

Administration When One Party Is Regulated

When at least one party to nonpoint trading operates under the conditions of a state requirement or local ordinance, trading can be fully or partially administered through the applicable requirements.

Usually, construction, operating, and other types of requirements that cover nonpoint sources include the following information that is useful to support trading:

- Name and address, and site address if different.
- Required BMPs (identified as performance- or design-based), performance standards, and mitigation/restoration.
- Location of BMP/restoration project if off-site.
- Special off-site conditions (e.g., two acres off-site equal one acre on-site, monitoring, reporting).
- General conditions for compliance.
- Inspection rights.
- Enforcement measures.

If programs already offer off-site options under certain circumstances (and in effect have a trading program), nonpoint/nonpoint trading can be administered easily through this existing option. If off-site options are currently unavailable, areas considering trading can look to other jurisdictions offering off-site options as models. It might be appropriate to supplement existing requirements with additional site-specific information to ensure that water quality managers and

nonpoint source owners are aware of trading activities.

When BMPs are implemented at different sites than they would be in the absence of trading, authorities and nonpoint sources can involve appropriate organizations in a variety of ways to facilitate trading and maximize effectiveness. Options to involve other organizations include sharing information, engaging them in identifying trading opportunities, and assigning them responsibility for oversight, monitoring, and/or technical assistance.

Administration When Both Parties Are Unregulated

Trades involving unregulated nonpoint sources may generally rely on existing technical and financial assistance networks to help administer trading. In many areas, assistance is available to nonpoint sources that implement BMPs voluntarily.

Trading is easier to administer between nonpoint sources covered by the same program. Cross-source trading is more difficult to administer since partners may be unfamiliar with each other, and different programs may be incompatible.

EXHIBIT 8.6: APPROACHES FOR ENHANCING ACCOUNTABILITY AND ENFORCEMENT

- Select sites where BMPs are visible and easily monitored.
- Select sources where a commitment to operation and maintenance exists.
- Require the posting of a performance bond.
- Execute contracts or agreements that specify responsibilities and enforcement consequences.
- Vest accountability in the off-site landowner.
- Vest accountability in a third party.
- Monitor BMP performance periodically to detect problems and provide assistance.
- Use economic, political, public relations, and other incentives to ensure full implementation.
- Provide interested volunteers with information on BMP location maintenance.

8.7 Accountability and Enforcement

Trading programs function differently depending on the regulatory status of partners involved. For example, when regulated nonpoint sources trade with each other, permitting authorities want to be sure that each party to a trade fully meets applicable permit conditions. Permitting authorities can specify trading arrangements as permit conditions for nonpoint sources involved in trading.

Where regulated nonpoint sources trade with unregulated nonpoint sources, permits could specify that regulated parties are responsible for off-site BMP implementation. This provides the permit authority control over water quality. Alternatively, nonpoint source owners/managers or third parties can accept responsibility for BMPs through contracts or other agreements.

One way nonpoint/nonpoint trading can increase the effectiveness of BMPs is by targeting implementation at a place and/or source where the level of accountability and enforcement is higher than it is on-site. BMP effectiveness is dependent, in part, on proper installation and maintenance. This includes holding nonpoint sources accountable when implementation is poorly executed and enforcing that accountability.

Nonpoint Source Accountability and Enforcement Are Limited

One distinguishing feature of nonpoint/nonpoint source trading is that pollutant control requirements are almost always technology-based or performance-based, as opposed to water quality-based. Nonpoint sources satisfy requirements by implementing and maintaining required BMPs. If BMPs are properly implemented and maintained but do not provide the expected level of pollutant control, nonpoint sources are generally not required to take additional measures.

Other limitations also may decrease the accountability of nonpoint sources involved in trading. Many regulatory programs have insufficient resources to conduct inspections to ensure that BMPs and restoration projects are properly installed and maintained over time. As a result, full advantage is not always taken of existing enforcement authority.

Additionally, when problems are identified, it may be impractical or infeasible to initiate enforcement actions for a number of reasons (e.g., business closure). Even when enforcement occurs, remediation can take a long time. Sometimes, the only leverage managers have over nonpoint sources that install or maintain BMPs improperly is to reduce or eliminate certain technical assistance, financial support, or eligibility for other programs.

Several approaches, listed in Exhibit 8.6, can be used to enhance existing accountability and enforcement for nonpoint/nonpoint trading. Accountability is also discussed in more detail in Chapter 7.

8.8 Worksheet/Checklist

The following checklist outlines key questions to consider in implementing a nonpoint/nonpoint source trading program. It is not necessary for each of these questions to be answered favorably for trading to succeed. The chances for success will be greatest, however, if all interested parties are aware of these issues and take them into account as they pursue the potential benefits of a trading program.

WORKSHEET FOR EVALUATING SUCCESS OF NONPOINT/NONPOINT SOURCE TRADING

Legal and Regulatory Conditions	
General:	
C Is nonpoint/nonpoint source trading implemented within the context of state or local regulations and management plans?	yes no
Specific:	
C Are certain types of nonpoint sources required to implement specific BMPs to control pollutant discharges?	yes no
C Are local or state permits flexible enough to allow trading among nonpoint sources?	yes no
C Do trades comply with the conditions in permits?	yes no
C Are there unregulated nonpoint sources available to trade with regulated sources?	yes no
Economic Conditions	
General:	
C Can nonpoint sources save or make money by trading (i.e., are there economic incentives to trade)?	yes no
Specific:	
C Do total incremental costs for BMPs, which include direct incremental costs and transaction costs, differ among nonpoint sources?	yes no
C Do cost differentials among nonpoint sources allow one discharger to implement BMPs more cheaply than another?	yes no
C Are transaction costs less than cost savings from a trade?	yes no
C Do cost savings from trading outweigh the uncertainties that nonpoint sources face under trading schemes?	yes no
C Is there a sufficient supply of BMP implementation for sale, ras well as a reasonable demand to buy BMP credits?	yes no
Data Availability Conditions	
General:	
C Are the data necessary to implement a trading program available or estimable?	yes no
Specific:	
C Are there enough data to understand pollution quantities and flows within the watershed (e.g., have water quality authorities conducted a TMDL that includes load allocations)?	yes no
C Can regulatory authorities monitor water quality under trading?	yes no
C Can nonpoint sources and regulatory agencies calculate or estimate the water quality effects of BMPs?	yes no
C Can nonpoint sources or regulatory agencies calculate or estimate the costs of implementing various types of BMPs?	yes no
C Can a regulatory agency calculate the average cost of all BMPs for a watershed, if a banking system is planned?	yes no
C Can nonpoint sources estimate transaction costs that they would have to pay to conduct trades?	yes no

Administrative and Institutional Conditions	
General:	
C Are governmental authorities and potential trading participants capable of administering a trading program?	yes no
Specific:	
C Do governmental authorities have enforcement mechanisms to ensure trades are being implemented correctly?	yes no
C Are governmental authorities with expertise in different types of nonpoint sources available to help administer trading programs?	yes no
C Is a governmental agency capable of operating a bank or fund for purchasing BMPs, if a banking-style trading program is desired?	yes no
C Are responsibilities clearly defined for administering institutions and nonpoint sources taking part in trading?	yes no
C Is the scope of administrative infrastructure compatible with the amount and complexity of the trading that is expected?	yes no
C Is accountability for implementation and success of BMPs clearly established?	yes no
C Can the agency responsible for enforcing trading provisions give necessary feedback to parties responsible for water quality?	yes no